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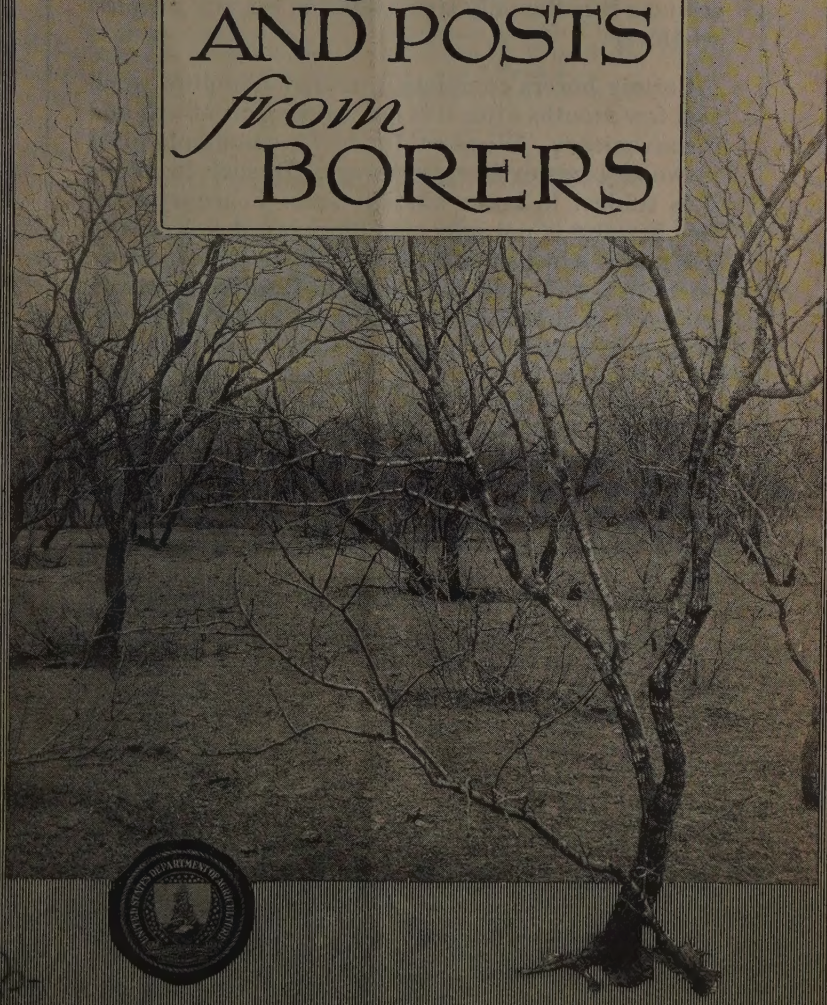
Protection of MESQUITE CORDWOOD AND POSTS from BORERS



MESQUITE is used throughout the southwestern United States for many purposes, the most important of which are fuel and fence posts. In many sections it is the only tree available for any purpose whatever.

Certain borers completely destroy mesquite wood in a few months after it is cut, causing great loss and inconvenience. Wood cut for fuel is commonly piled in wood yards or along railways. In such locations it is subject to borer damage from February until October and is not infrequently reduced to a worthless pile of sawdust and honey-combed sticks. Fence posts are damaged by sapwood-feeding forms in such a way that staples become loose and the posts must be constantly replaced.

It has been found that by cutting fuel wood at certain seasons and turning more valuable products in the sun practically all insect damage can be prevented.

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PROTECTION OF MESQUITE CORDWOOD AND POSTS FROM BORERS.

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IMPORTANCE OF THE MESQUITE.

Two or three species of mesquite (figs. 1, 2) occur in the southwestern United States and many more are widely distributed throughout the world. Mesquite's adaptation to arid climates makes it an extremely useful tree. In many countries it is chiefly valuable for the food product derived from the bean, although in the United States this is but little exploited at present. In much of the Southwest it is the only available wood.

All of the species or varieties occurring in the Southwest are put to many uses. The wood, being close-grained, hard, heavy, and very durable, makes excellent fence posts, frames for adobe houses, and, to a limited extent, mine props and crossties. The large roots and thickened bases of the stems furnish the best available fuel of this region.

The wood of all varieties of mesquite is the favored food of many borers, which completely riddle it and render it practically worthless a few months after it is cut. Some destroy the sapwood and honeycomb the heartwood within five months (fig. 3); others reduce the sapwood almost to dust within four months (fig. 4) so that fence staples drop out and let the wires down, necessitating constant replacing of the posts. It is not uncommon to see piles of cordwood so riddled that the individual sticks are easily broken and the spaces between the sticks are completely filled with boring dust. Dealers in mesquite fuel suffer considerable losses through such insect damage.

[1] Resigned Dec. 31, 1920.

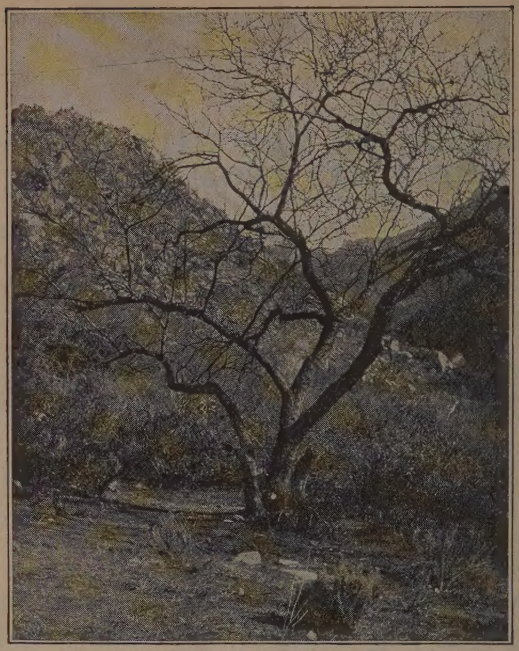

FIG. 1.—An average sized mesquite tree, showing characteristic form. Sabino Canyon, Catalina Mountains, Ariz.

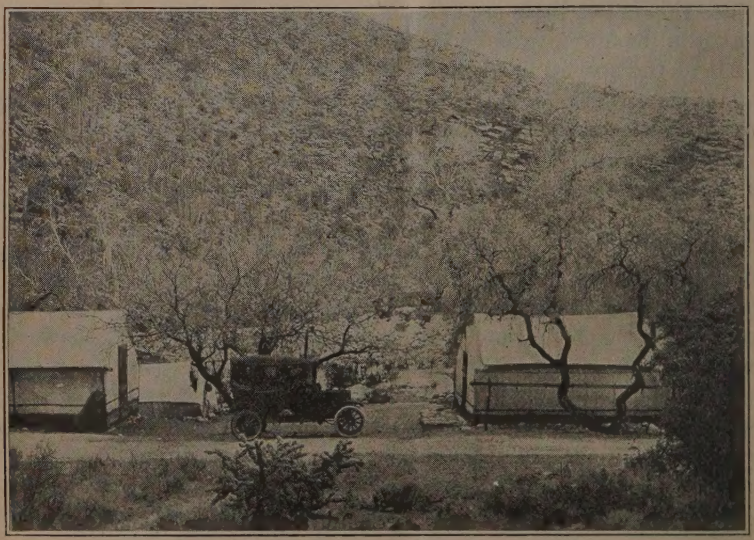

FIG. 2.—Forest Insect Field Station, Sabino Canyon, Catalina Mountains, Ariz. The trees growing close to the tents are mesquites.

FIG. 3.—Section of mesquite wood five inches in diameter, showing the sapwood destroyed and the honey-combed heartwood six months after attack by the roundheaded borer.

FIG. 4.—Section of mesquite stick after four months work by smaller powder-post grubs, showing depth to which sapwood is eaten. The small holes in the bark are made by the adults which have emerged.

INSECTS RESPONSIBLE FOR THE DAMAGE.

Although many different insects feed in the mesquite, not more than five or six are responsible for most of the injury in any locality, being numerically the more abundant or causing the greater damage by the character of their work.

These insects, according to their structure and the character of their work, may be grouped into three types or classes—namely, roundheaded borers, powder-post beetles, and flat-headed beetles. In the vicinity of Tucson, Ariz.,[1] where the experiments were conducted on which the results of this paper are based, there is only one round-

FIG. 5.—Adult beetle of the roundheaded borer in mesquite. Enlarged.

headed borer[2] of much economic importance, but this is the most destructive insect in mesquite. Three powder-post beetles are found, a large,[3] a medium,[4] and a small[5] form. One flat-headed borer[6] has been found to cause considerable injury.

CHARACTERISTICS OF THE INSECTS AND THEIR WORK.

All these insects have several distinct forms, known as the egg, the larva, the pupa, and the adult stages, but it is only the larval or

[1] In Texas another species of roundheaded borer (*Cyllene crinicornis* Chev.) and several other species of powder-post beetles (*Xylobiops* spp.) are equally numerous. Their habits are much the same and similar methods of treatment are effective.

[2] *Cyllene antennatus* White (Figs. 3, 5–8.)

[3] *Apatides fortis* Lec. (Figs. 9, 12.)

[4] *Dendrobiella aspera* Lec. (Figs. 4, 11, 13, 14.)

[5] *Xylobiops* sp. (Figs. 4, 14.)

[6] *Chrysobothris octocola* Lec. (Figs. 8, 10, 15.)

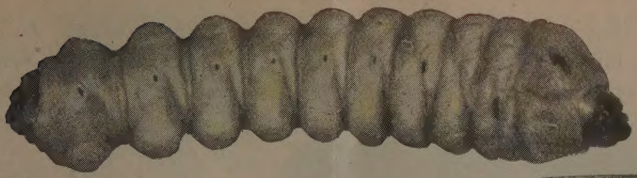

FIG. 6.—Larva, grub, or boring stage of the roundheaded borer in mesquite. Enlarged.

FIG. 7.—Section of mesquite with bark removed, showing larval mines and exit holes of the roundheaded borer.

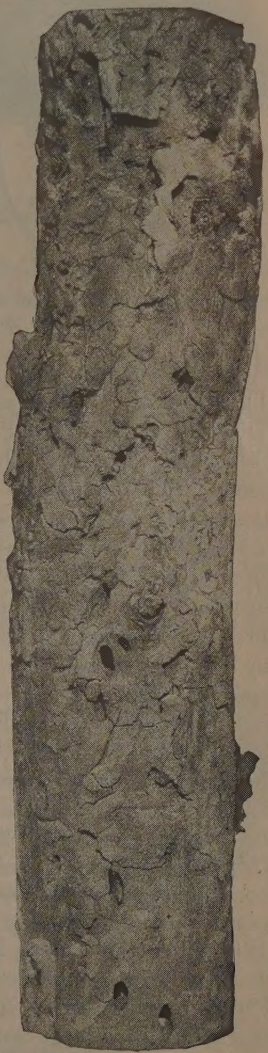

FIG. 8.—Mesquite stick with bark removed, showing larval mines of the roundheaded and flat-headed borers.

grub form that is responsible for the destruction of the wood. In all cases these larvæ hatch from eggs laid by the adult beetles. Some of these beetles are rarely seen, as they lie concealed during the day and deposit their eggs at night.

FIG. 9.—Adult beetle of the large powder-post borer in mesquite. Enlarged.

The adult round-headed borer (fig. 5) is a rather large beetle, slightly tapering behind, brown and gray mottled, one-half to one and one-quarter inches long, with quite long flexible horns. It places the eggs in crevices or under scales of the bark. From these eggs hatch tiny grubs that grow into rather large cylindrical borers (fig. 6), from three-quarters to one and one-half inches in length, yellowish white in color, and with a pair of strong brownish jaws. This is the largest of the borers in recently cut wood. The damage to the wood begins after these grubs hatch and bore in through the bark and sapwood, feeding as they go (figs. 3, 7, 8). They spend from 40 to 60 days mining in the sapwood, reducing it almost to powder, and then enter and honeycomb the heartwood by excavating long, oval galleries. Two months or more pass before there is any external evidence to show that the wood is seriously damaged. The boring dust expelled through a hole in the outer bark is the first and outward evidence of damage. This hole is enlarged as the borer increases in size, and through it the beetle finally emerges (fig. 7). This borer shows a preference for freshly cut wood, but has been known to attack wood cut five months, especially large limbs or sections of the trunk when they are in contact with the ground. It is the most destructive of the mesquite insects. The fact that a stick 4 inches by 2 feet contained over 60 of these large borers illustrates how thorough a honey-combing takes place.

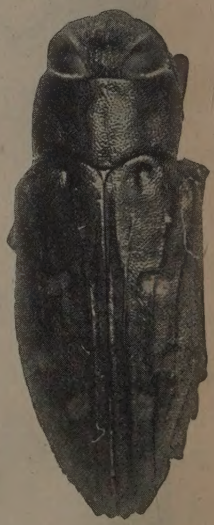

FIG. 10.—Adult beetle of the flat-headed borer in mesquite. Enlarged.

The powder-post borers, as adult beetles (figs. 9, 11), are small to medium sized, short, cylindrical, dark brown to black, and hard shelled. The smaller forms bore through the bark and around the

stem, laying eggs along this tunnel; while the larger form lays its eggs under scales of bark, as do the roundheaded borers. The grubs (figs. 12, 13) which develop from these eggs are curled like a closed finger, so that the head and the end of the body almost meet. They are thicker at one end, and range from one-quarter to three-quarters of an inch in length. The smaller forms appear in enormous numbers, completely riddling the sapwood with cylindrical holes tightly packed with fine powder that falls out when disturbed. By the time they are full grown they have almost destroyed the sapwood (figs. 4, 14). The grub of the larger form feeds only a short while in the sapwood and then goes into the heartwood, where most of the feeding is done. It seldom attacks freshly cut wood, but shows a decided preference for older and drier sticks and posts. It has only one generation each year.

FIG. 11.—Adult beetle of the medium-sized powder-post borer in mesquite. Enlarged.

FIG. 12.—Larva, grub, or boring stage of the large powder-post beetle in mesquite. Enlarged.

The flat-headed borer, as an adult beetle (fig. 10), is hard shelled, flattened, oval, from one-half to three-quarters of an inch in length, and shining bluish black with light golden yellow spots on top. It lays its eggs on the bark. From these develop flattened yellowish white hammer-shaped worms (fig. 15), having the head end of the body much wider than the remainder. The larvæ mine between the bark and wood, grooving the sapwood with winding galleries until nearly full grown. (Fig. 8.) These mines are flattened in cross section and filled with fine, tightly packed "sawdust" that does not easily fall out, and when it does so loosens in cakes.

FIG. 13.—Larva, grub, or boring stage of the medium-sized powder-post beetle in mesquite. Enlarged.

SEASONAL ACTIVITY OF THE BORERS.

There is practically no month of the year in southern Arizona when some few of these beetles do not fly about seeking new wood

on which to lay their eggs. During certain periods, however, their number is almost negligible.

The roundheaded borer has two generations a year and two periods during which the beetles are abundant. The overwintering forms mature and the adults emerge and fly chiefly during March and April. From these originates the summer generation, which develops in five months, the beetles emerging in August and September.

The powder-post borers fly as adults more or less during the entire year, although during November, December, and January very few are to be found. The medium and the smaller forms are most abundant from April to September, and during this time they develop very rapidly, producing two or three generations a year. During the hot part of the summer adult beetles develop from eggs in 60 to 70 days. The large powder-post beetle is active from July to September, having only one well-defined generation in a year.

The flat-headed borer flies about from March to October, being most abundant in April, May, and June. There is apparently only one main generation a year, although some develop more slowly than others, thus extending the period during which the beetles fly.

CONDITIONS FAVORABLE AND UNFAVORABLE FOR ATTACK.

The large powder-post beetle prefers wood which has dried out for several months, but all the other borers show a decided preference for freshly cut wood on which to lay their eggs. Some exceptions have been noted, but this is the general rule. Wood which is cut in the fall and seasoned during the winter months is very unattractive in the spring months when the beetles are flying about in search of suitable material for the development of their broods.

It has also been found that only the underside of logs or branches, or those pieces of wood not in the direct sunlight, are selected for feeding. During the greater part of the year the sun heats the upper surface so much that it is impossible for anything to live on it.

METHODS OF PREVENTING INJURY.

Upon a knowledge of the habits and seasonal activities of these insects must depend any method for combating them. It has been shown that during certain seasons of the year few of these insects fly about, that they do not like seasoned wood, and that they can not live beneath bark exposed to direct sunlight. Taking advantage of these factors, the following methods have been tried for preventing damage by them and have proved very successful for all practical purposes.

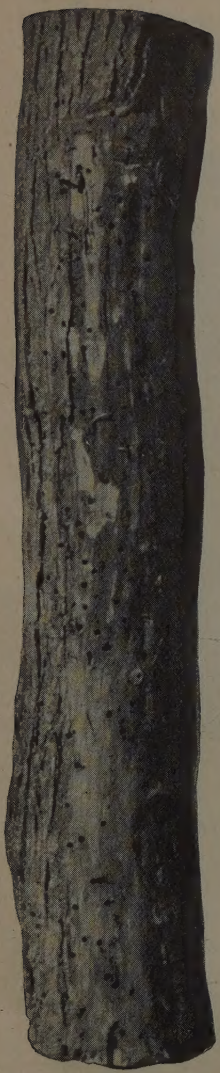

FIG. 14.—Mesquite stick showing exit holes of the medium and small powder-post beetles.

FIG. 15.—Larva, grub, or boring stage of the flat-headed borer in mesquite shown from above and below. Enlarged.

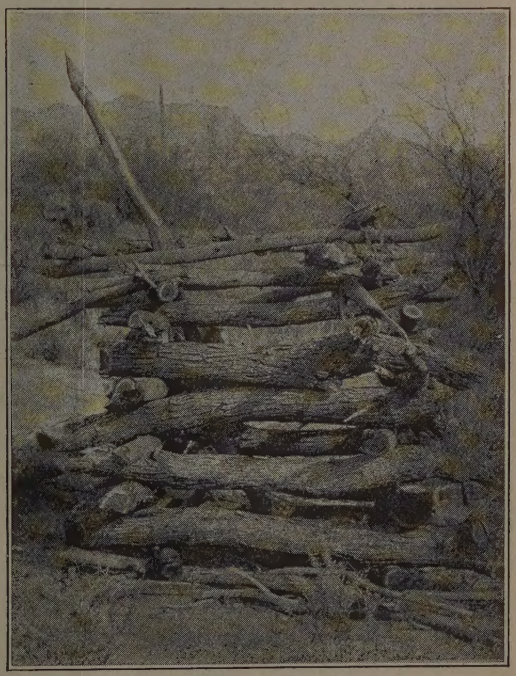

FIG. 16.—"Wigwam" method of piling mesquite cordwood. This type of piling is best, if the cutting is done between October 15 and December 15. It permits rapid seasoning of the wood during the period when the insects are not flying.

Except for immediate use mesquite cordwood should not be cut during the spring and summer months. Wood which is cut between the middle of October and the latter part of January and which is loosely ricked (figs. 16, 17), so that it quickly dries, is usually but little injured. The safest period, however, is from the middle of October to the end of November. Wood should not be stored longer than one year, after which much damage is done by the large powder-post beetle.

FIG. 17.—Mesquite ricked in open cribs, permitting of rapid seasoning. This is done in late fall and winter before the insects fly.

It has been found that extreme heat prevents attack and kills the grubs which may be in the sapwood. Therefore, the best method for treating posts and more valuable material that has to be cut between March and October is to lay them flat on the ground in the sunlight, then after two weeks turn bottom side up, and repeat the turning two weeks later. Two turns in six weeks are sufficient to kill the grubs or prevent attack. This method can be used effectively only between April 1 and October 1.